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United States Department of Agriculture
Bureau of Animal Industry
Animal Husbandry Division
and
Animal Nutrition Division

BATTERIES FOR CHICKENS

The keeping of chickens in batteries is a relatively new practice. Where chickens are raised indoors, they must be kept under the strictest kind of sanitary conditions and fed properly balanced rations containing fish liver oils. The battery method is most generally used by hatcherymen and specialized broiler producers. It is particularly adapted for holding chicks for one to two weeks and for raising broilers in complete confinement. However, only a small percent of the market broilers are raised in batteries. Batteries are also used to some extent for brooding chickens, for brooding turkey poults, and for keeping laying hens.

Batteries are usually made of angle iron, galvanized steel, and electrically welded wire. Some batteries are made of wood with wire floors. They vary greatly in type, size, and in capacity, depending upon the available floor space and the size of the birds. From one to five decks are provided in the batteries and each deck is equipped with wire floors, pans, or belts for the droppings and troughs for feed and water. Most batteries for young chicks are also equipped with automatic heating devices and are operated in rooms where a temperature of 60 to 70 degrees is maintained.

Battery brooding should be attempted only by those who will give regular and careful attention to the care of the chicks and brooders. As the chicks are closely confined, do not get any sunlight, and get only the feed which is given them, they are absolutely dependent upon the operator. Unless conditions are kept just right, difficulties, such as the picking of feathers or flesh, overcrowding, and leg weakness of various kinds, are more likely to occur in battery brooding than where the chicks are brooded on range. Broilers raised in batteries are usually soft fleshed and lose more weight when shipped long distances to market than do broilers raised on range.

Feeding the Chicks

Feeding is an extremely important factor in battery brooding as the chicks have no chance to balance their ration with green feed, minerals, and other feeds usually picked up on range. The chicks are usually fed all-mash rations which include milk and minerals. Fresh green feed is not ordinarily supplied but alfalfa leaf meal is generally included as a substitute for green feed. Cod-liver or suitable fish oils must be included in the ration. The use of this oil prevents the type of leg weakness caused by lack of vitamin D and sunlight.

The following all-mash starting and growing diets are recommended for feeding chicks in battery brooders:

| Diet No. 1 | | Diet No. 2 | |
|----------------------------|------------------|----------------------------|------------------|
| | Parts, by weight | | Parts, by weight |
| Ground yellow corn - - - | 32.0 | Ground yellow corn - - - - | 30.0 |
| Wheat middlings - - - | 20.0 | Finely ground oats - - - - | 10.0 |
| Wheat bran - - - - - | 15.0 | Wheat middlings - - - - - | 10.0 |
| Dried skim milk - - - - | 5.0 | Wheat bran - - - - - | 10.0 |
| Meat scrap - - - - - | 5.0 | Dried skim milk - - - - - | 10.0 |
| Fish meal - - - - - | 5.0 | Meat scrap - - - - - | 10.0 |
| Alfalfa leaf meal - - - | 5.3 | Alfalfa leaf meal - - - - | 8.0 |
| Soybean meal - - - - - | 5.0 | Soybean meal - - - - - | 10.0 |
| Corn gluten meal - - - - | 5.0 | Ground limestone - - - - - | 1.0 |
| Ground limestone - - - - | 1.0 | Cod-liver oil (high grade) | 0.5 |
| Cod-liver oil (high grade) | 0.5 | Salt - - - - - | 0.5 |
| Salt - - - - - | 0.7 | | 100.0 |
| | 100.0 | | |

These mashes are made up of different products and each contains approximately 22 percent of protein. A salt mixture, which very markedly tends to prevent perosis or slipped tendons, composed of 100 parts of salt and 2.2 parts of anhydrous manganous sulphate, or 3.2 parts of manganous sulphate tetrahydrate, may be used in place of the salt. Since these mashes call for only a small percent of cod-liver oil, it is essential that a high-grade oil be used. It is advised that this oil be mixed fresh in the feed. A small amount of insoluble grit may be provided for the chickens.

The chicks are usually given water to drink and fed as soon as they are put into the brooder. Mash is kept before them all the time. Chicks for broilers may be raised without any change in this feed except to omit the cod-liver oil for 2 weeks before marketing.

Chicks' picking one another often causes great loss in battery brooding and this habit is difficult to control. The use of ruby-colored light in the brooder or in the room, either from colored bulbs or from stained windows, darkening the brooder room, or "tipping" the upper beak of the chickens, are some of the methods used in overcoming this vice. Overcrowding the chickens aggravates this habit. A soft, well-diffused light is desirable, arranged to throw most of the light on the feeders and not to have a bright light on the chickens.

Temperature and Humidity

The temperature to use depends on the kind of batteries and on the age of the chickens. The object should be to keep the chicks comfortable at all times. This usually requires a battery temperature, at first, of 90 to 95 degrees, which is gradually reduced from $\frac{1}{2}$ to 1 degree daily to a temperature between 70 and 78 degrees by the end of the fourth week. A fairly rapid reduction of temperature in the battery and a cool room temperature tend to improve feather growth.

Good ventilation is very essential where large numbers of chicks are kept in battery brooders. The brooders should be operated in well-insulated rooms with ceilings from 8 to 10 feet high. Plenty of space should be allowed between the batteries. Batteries should be placed not closer than 12 to 15 inches apart in the rows, and the aisles between the rows should be not less than 3 feet wide. Fairly high humidity in the room is desirable, especially for chicks from 1 to 3 weeks old. The humidity may be reduced gradually for older chicks but as chicks of various ages are usually kept in one room, a fairly high humidity should always be maintained. While the humidity may be raised by sprinkling the floor with water several times a day it is difficult to maintain high humidity without humidifying equipment.

Because chicks grow rapidly there is a tendency to permit the batteries to become crowded. It is estimated that at least 10 square inches of floor space should be provided for each chick. This amount of space should be increased to 18 square inches per chick by 3 weeks, to 30 square inches by 6 weeks and to 45 square inches by 8 to 9 weeks. No litter is necessary with batteries. The dropping pans should be cleaned daily and the batteries thoroughly cleaned and disinfected whenever they are emptied.

Batteries for Broilers

Battery brooders are used by some for producing broilers especially during the winter and early spring months. However, brooder houses with canopy brooders are used more commonly than the battery system in the commercial broiler producing sections. Leghorn cockerels will weigh from 1 1/2 to 1 3/4 pounds at from 8 to 9 weeks of age; the heavier breeds are usually marketed when they weigh from 2 to 2 1/2 pounds, which will be at from 8 to 11 weeks of age. It takes from 6 to 7 pounds of feed to grow a 2-pound broiler in the heavier breeds, and 9 1/2 to 11 pounds to grow a 3-pound chicken. Broilers raised in batteries are regarded by some as being more tender than broilers raised on range. The highest broiler prices are usually obtained in the early spring and the lowest prices in the fall. The higher prices of early spring gradually taper off but usually remain fairly good through June. Broiler prices fluctuate much more both with seasons and with different years than prices of other classes of poultry.

Batteries for Laying Hens

Batteries are used to a very limited extent for laying hens. They give the poultryman the daily egg production of each hen, making it easy to cull the poor layers as soon as they cease to be profitable. Growing pullets should be available for replacements in order to utilize the battery equipment efficiently. Pullets must have high vigor and vitality to do well in batteries. With good equipment and proper management, hens in batteries should lay approximately the same number of eggs as hens kept on the floor in ordinary hen houses. Keeping each hen in a separate compartment in the batteries prevents cannibalism, which is often the cause of considerable mortality when laying flocks are kept confined.

The battery method requires more equipment than well-insulated laying houses, but if batteries are arranged to keep more hens on the same area of floor space the cost per hen may not be much more. Well-insulated houses, which are heated in cold weather and in which the air is

artificially circulated in warm weather, are considered essential in most parts of the country, to keep hens in batteries comfortable. The ceilings should be from 9 to 10 feet high. Artificial lights are provided and used to give the hens about a 12 to 14-hour day during the winter months. This extra equipment materially increases the investment on the poultry farm over the single wall, unheated laying houses commonly used.

All-mash diets are generally used for feeding hens in batteries. Feeds which are coarsely ground are preferred for all-mash rations. Pellet feeding is being used to some extent. Good results can not be secured unless well-balanced diets are fed which contain just the right amount of vitamins, proteins, and minerals.

The following all-mash diets for feeding laying hens in batteries are recommended:

| Diet No. 1 | | Diet No. 2 | |
|----------------------------|------------------|----------------------------|------------------|
| | Parts, by weight | | Parts, by weight |
| Ground yellow corn - - - | 39.1 | Ground yellow corn - - - - | 40.9 |
| Wheat middlings - - - - | 20.0 | Finely ground oats - - - - | 10.0 |
| Wheat bran - - - - - - | 15.0 | Wheat middlings - - - - - | 10.0 |
| Dried skim milk - - - - | 5.0 | Wheat bran - - - - - - - | 10.0 |
| Meat scrap - - - - - - - | 2.0 | Dried skim milk - - - - - | 5.0 |
| Fish meal - - - - - - - | 2.0 | Meat scrap - - - - - - - | 4.0 |
| Alfalfa leaf meal - - - | 6.0 | Alfalfa leaf meal - - - - | 7.0 |
| Soybean meal - - - - - - | 2.0 | Soybean meal - - - - - - - | 4.5 |
| Corn gluten meal - - - - | 2.0 | Linseed meal - - - - - - - | 2.0 |
| Ground limestone - - - - | 3.5 | Ground limestone - - - - - | 3.0 |
| Special steamed bone meal | 1.0 | Special steamed bone meal | 1.5 |
| Salt - - - - - - - - - - | 1.0 | Salt - - - - - - - - - - | 0.7 |
| Cod-liver oil (high grade) | <u>1.4</u> | Cod-liver oil (high grade) | <u>1.4</u> |
| | 100.0 | | 100.0 |

These diets are made up of somewhat different products and each contains approximately 16.5 percent of protein. They contain sufficient calcium for good egg production. A small amount of insoluble grit may be provided either in the mash or in a separate container.

Batteries for laying hens have demonstrated their usefulness but much improvement is being made from time to time in the battery equipment, in the arrangement and operation of the battery rooms, and in the feeding of the hens. It is yet to be determined whether eggs can be produced under most conditions as economically in batteries as they can by the ordinary methods of keeping hens.

The use of the complete battery system, including the raising of pullets in batteries to laying age, is extremely limited and still very much in the experimental stage.

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